Peer Review of CDC Phase II Report to Congress

Questions with Peer Reviewer Responses and CDC Reply

Question 1. The Phase II report combines the CDC review with a letter report from EPA. Do the EPA findings and recommendations conflict with the CDC report in any way? Are there any confusing or conflicting findings or recommendations in the report as a whole? If so, please describe.

Peer Reviewer	**Reviewer Response**	**CDC Response**
Number 1	No conflicts were noted.	No action required
Number 2	1. One very confusing spot in the EPA report was the section starting on P. 29. On the last line, the report reads "DuPont performed statistical analysis from the test results." The reference is to CVXH. The next two sentences also refer to CVXH. 2. With absolutely no lead-in, EPA next provides the procedure for disposal of Army's Aberdeen caustic Mustard hydrolysate. The relevance is not only unclear, it is oblique. The same procedures cannot be followed for CVXH as for caustic Mustard hydrolysate. If EPA expects the same procedure for CVXH, this is a conflicting finding.	1. The original text was *The tests on treatability were conducted to determine the Chambers Works' range of feed rates to give DuPont an idea of their flexibility in running material. DuPont performed a statistical analysis on the materials from the test results.* This was changed to *The tests on treatability were conducted to determine the Chambers Works' range of feed rates to give DuPont an idea of their flexibility in running <u>CVXH</u> material. DuPont performed a statistical analysis on the <u>CVXH</u> from the test results.* for clarity. 2. The Aberdeen material will be completed prior to the Newport CVXH. This is not an issue.

	3. Another section in which there is confusion is on P. 23. First EPA states "The ability to conduct such tests will not present itself until the actual alternate processing of the CVXH and ACH begins." In the next paragraph, EPA recommends bioassessment studies should be done with the implication that this should be done before processing of CVXH starts (also see P. 33). EPA should make clear that while such testing is required it should not hold up the processing of CVXH. It would probably take a year for the proposed team to get established and get in agreement about the tests that should be done. DuPont already has such data. On P. 24, I have noted some typos and incorrectness. 4. 2nd paragraph under "Response" at line 4: change "will decrease VX from" to "will decrease VX in the hydrolysate from". 5. 2nd paragraph under "Response" at line 6: Change "$10^{?32}$" to "10^{-32}". 6. On Page 24, it should be noted that the proposed DuPont procedure combines the hydrolysate with sodium persulfate and hydrogen peroxide with subsequent treatment with ferric chloride and a lime slurry. Under "Finding", it would be more	3. The implementation of a baseline in-situ ecological assessment in the vicinity of the DuPont facility prior to discharge of treated hydrosolate is recommended by the USEPA. Due to the public scrutiny of this project and the unique nature of this wastestream, an ongoing program designed to monitor in-stream health and biological community structure using fish, macroinvertebrates, plus sediment and water chemistry in the vicinity of the DuPont discharge is recommended. It would be of greater benefit to collect baseline data prior to any processing of CVXH. Once the new wastestream is discharged, a snap shot of the receiving water's biological condition prior to CVXH waste discharge is lost. If Dupont already has such data, as the reviewer asserts, then an in-situ biological study prior to processing the CVHX is not an issue. 4. Corrected per recommendation 5. Corrected per recommendation 6. EPA is referring to the August 2005 Army study and report *Effect of the DuPont Persulfate Treatment Process on Trace Quantities of VX and EA2192 in Hydrolysate.* The Finding is rephrased to *"EPA believes that with the addition of DuPont's proposed persulfate oxidative*

	complete if EPA would reference to which DuPont study they were referring. I have only three and did not find the "non-detect" designation (or 10^{-32}) in any of the studies.	*treatment process to the Chambers Works facility's treatment regime, the SET will be capable of reducing any levels of VX or EA2192 that could potentially be present to non-detect*."
	7. I was surprised the EPA on P. 25 referred to <u>iron</u> chloride in the middle of the page. The iron ion has valances of 2 and 3. If ferrous chloride were used, the coordination covalent bonds would not be formed. While this is a technicality, it addresses correctness and completeness. Also on the same page, EPA uses the acronym "NPDES" without providing its meaning (National Pollution Discharge Elimination System).	7. Iron chloride has been changed to ferric chloride. NPDES is defined on page 20 at the beginning of the EPA section 4.
	8. On P. 26, next to last line, the word "Treated" needs to be inserted before "caustic VX hydrolysate". This is important since DuPont has stated that it will not accept VX hydrolysate with VX concentrations greater than 20 ppm and untreated CVXH contains higher concentrations.	8. The CVXH will not be "treated" at the point of acceptance at the DuPont SET facility; it will be "untreated" CVXH as feed for the SET. CVXH received by the SET, by definition, is treated VX cleared for shipment and to refer to it as "treated" CVXH would be confusing to the reader. Therefore, CDC will not make this change.
	9. On P. 30, the word "potential" should be inserted before "flammability characteristic". Flammability involves other factors than flash point and DuPont will not accept batches with flash points below 140F. The concentration in air is equally important in whether or not there is a fire hazard from the hydrolysate effluent. For example,	9. Corrected per recommendation

	ethanol is flammable only between 3 and 19% in air ("Weast Handbook of Chemistry and Physics").	
	10. Another section that has conflicting findings is the last section of the "Highlights" on P. 2. (It is not clear why the review starts with P. 2, but that is not important.) What is important is the phrase "but limited operations have precluded the development of long-term quality assurance/quality control (QA/QC) data to demonstrate this." If this is true, this document is not ready for review. It is my opinion that Parsons and DuPont have demonstrated capabilities in sampling adequate to monitor operations at both sites. While it is true that as operations proceed some sampling procedures will need to be modified to ensure adequate long-term QA/QC, but the sampling procedures presently in place are adequate for the foreseeable future. This phrase as it stands indicates that the beginning of operations is still a long way off. Modification of this section is indicated.	10. The report acknowledges that the current system has been demonstrated to be capable of providing suitable data for CVXH clearance. The intent of CDC's discussion was to support its recommendation of a quality assurance approach often used in air monitoring programs at chemical agent demilitarization facilities. That approach is one of establishing a "running baseline" for precision and accuracy data that confirms that analytic data remains in statistical control throughout the life of the project. CDC believes that it is prudent, and because of the ongoing need for accurate characterization of CVXH, vital to maintain a continuing confirmation of the effectiveness of the sampling and analytic system. The report has been rephrased to *Performance data on representative sampling should continue to be collected as the plant transitions into production mode to maintain statistical confidence that representative hydrolysate samples are being collected consistently over time and from varying hydrolysate batches.* to more clearly reflect the CDC's intent that there be a long term commitment for ensuring statistically supported CVXH clearance analysis.
	11. On P. 5, third bullet, the sentence should read:	11. Rephrased to: *In the Phase I review EPA*

	"In the Phase I review, EPA considered that the data was inadequate to assess ...." This is not the same as "EPA did not have".	*considered the data inadequate to assess the ecological toxicity associated with the DuPont plant discharge to the Delaware River.*
Number 3	Based on my review of the reference material (EPA letter report & the CDC [Carmagen Report January 2006]) and the Revised CDC report (February 27th 2006) itself, the EPA concerns and response to those concerns are reasonably well presented. However, 1. under the heading findings (pages 22-23) regarding alternate processing of CVXH and ACH lack clarity. To address EPA concerns, is there some assurance that secondary toxic reaction products will not be formed if alternate processing technology is employed? 2. page 24 In response to EPA concern regarding the SET site processing facility, the statement " According to DuPont, there will be no detectable levels of VX & EA 2192 in the hydrolysate transported and treated at the Chambers Works" does not provide sufficient assurance of the safety and surety of the process to address EPA concerns.	1. The Aberdeen material will be completed prior to the Newport CVXH. This is not an issue. 2. EPA's concern was that VX nerve agent and other toxic breakdown products could be present in the treated hydrolysate and that the SET is not capable of treating them if present. An August 2005 Army study demonstrated that the proposed DuPont peroxide/persulfate oxidation process destroys any traces of VX and EA2192 in the hydrolysate to below detection limits. The results of this study adequately addressed EPA's original concerns. DuPont and the Army will develop appropriate testing and documentation protocols assuring that the hydrolysate will contain no detectable levels

		of VX and EA2192.
Number 4	In so far as the letter report from EPA constitutes the essence of section 4 of the Phase II report, I did not find the findings or recommendations in conflict with the remainder of the CDC report.	Noted

2. Are there any technical data omitted or misapplied in the report that, if included appropriately, would result in an adverse public health, safety, or ecological impact? If so, what should have been added or changed?

Peer Reviewer	**Reviewer Response**	**CDC Response**
Number 1	None were found..	No action required
Number 2	1. The only technical data that is incorrect is in reference to flammability on P. 32. In the second paragraph on Line 8 under "Review", the sentence begins "Concurrently, the site found the material was flammable ..." implying that the hydrolysate was flammable, when this was not the case. It was the effluent from the heated CVXH that was flammable. In addition, it is importnat to note in the review that other factors are involved in flammability as well. For example, ethanol at less than 3% concentration in air is not flammable. If the concentration of the effluent is too high or too low it will not ignite. 2. A number of suggestions are made to ensure	*1.* Sentenced changed to: *Concurrently, the site found the produced hydrolysate met the criteria for flammability, which required further modification to the equipment and to the process.* 2. Suggestions were not included in the report.

	clarity on this page (32) and on Pp. 33 and 36.	
Number 3	1. In the manuscript there are a number of "lethal typos". (a) page 11 under criteria for shipment of CVXH : "A flashpoint (for determining flammability) below 140 degrees Farenheit" Should be above 140 degrees Farenheit. (b) page 12 next to last paragraph " ie a non detect for for the MDL (as defined by the EPA methods) below 20 parts per million for VX" Should be below 20 parts per billion VX	1. These have been corrected.
	2. Page 16 Under toxicology and Transportation review " transportation analyses in the phase 1 report still valid for material that meets Dupont criteria".. The conclusions from attachment 3 (Review of the Transportation and risk management provisions for the Caustic VX Hydrolysate) of the phase 1 report notes that the transportation analysis was based on information about CVXH produced with VX at the 8% loading level. The current plan calls for 16% loading. Given, the uncertainties surrounding the possibile flammability and corrosivity of the transport at the 16% level, the 8% loading and transport data and rationale employed appears misapplied in the current report.	2. The toxicity data examined for the phase I report was generated from hydrolysate produced at a VX loading level of 33%, which was the original anticipated process feed rate. The flammability issue has been addressed by adjusting the Newport process to purge the flammable fraction of the hydrolysate batch and including a new clearance criteria that demonstrates the CVXH to be nonflammable. DuPont's waste acceptance profile addresses pH limits of the waste and generally helps ensure that the waste transported is consistent with the characteristics examined for the transportation risk assessment.
	Page 28 Potential Impacts of discharge from DuPont on the local drinking water. The present conclusions rely on effluent stream studies performed by DuPont in 1984. In the period of time from 1984 to the present has	3. The other flow and dilution studies cited that took place in 1989 and 1990 were also used in CDC's deliberations and were thought to be appropriate to examine the question of potential impacts of

	there been any studies to document whether there have been significant changes in the river (course, outflow, discharges, urbanization) upstream and downstream from the discharge point that could affect flow conditions and contaminant content of the river.	this project on the local drinking water supplies. CDC also examined a 2002 report from the University of Delaware on source water assessment for United Water Delaware and a 2002 DNREC report on the impact of known and suspected sources on select public drinking water supplies.
Number 4	The majority of the findings and conclusions are very well supported by the data. However, there are a few points that could use more explicit discussion in the report. 1. As noted in the Phase I report, the 20 ppb limit was selected based on drinking water quality standards for military personnel – presumably health adults. This value may be problematic for children or other sensitive or otherwise compromised populations. 2. A concern that the EPA raised in the Phase I report was that trace amounts of VX or EA2192 could pass through the DuPont SET treatment facility. DuPont, to their credit, attempted to ameliorate this by testing VX and EA2192 spiked samples of CVXH. Their results showed that the DuPont process could "completely destroy" VX and EA2192 in the 16% hydrolysate. Two issues of concern arise here. a. The first is if VX and EA2192 were to survive the NECDF treatment and transport, many other constituents would also have survived and exert an oxidation demand on the treatment process. This has not been modeled or considered.	1. This is a true statement, but the health issues with the CVXH are due to caustic salts not VX at 20 ppb. The concentration in the Delaware River is expected to be below instrument detection with the proposed process. 2. The persulfate/ peroxide treatment adds a safeguard to provide destruction of any residual VX that could be present that was not in the original process proposal. a. Testing performed on the persulfate/ peroxide pretreatment indicated a very active reaction that, combined with the PACT® (Powdered Activated Charcoal Treatment) removed 99% of the organics

	Therefore, the behavior of the spiked VX may not be representative of off-spec batches. This caveat should be noted	and the phosphonates. A part of DuPont's acceptance profile for receiving CVXH sets an upper-bound limit on organic strength or chemical oxygen demand allowed in to their process. This provides control needed to maintain their process.
	b. Second, even if the solution/suspension matrix were representative, many recent studies have reported that spiked contaminants in natural dissolved organic matter matrices, behave quite differently from contaminants that have associated with the host organic matrix for a prolonged period of time. It is not clear if this scenario would apply to the CVXH. Perhaps a more appropriate test would have been utilizing untreated VX with various stabilizers.	b. That was not done for 2 reasons: 1, the surety and control necessary for neat VX and, 2, it was not felt to be representative of the process. This will be communicated to the Army as a possible test.
	3. The risk analysis associated with the transportation of the 16% CVXH appears to have been based on mean or bulk parameter characteristics. As noted in both Phases I & II reports phase separation, especially at the 16% loading is likely. The organic layer was estimated at 2-3%v in the Phase I report. Does the organic layer pose a separate flammability issue (compared to the homogenized CVXH)? Although there has not been analysis of the 8 or 16% CVXH organic layers, an analysis of the 33% CVXH organic layer indicated the possibility of residual VX at the 1 ppm level. It is a little worrisome that the composition of the organic layer is unknown. Because the LD_{50} of the CVXH is	3. The reviewer raises two concerns regarding the organic layer formation associated with CVXH. CDC has considered both of these concerns and believes that the recommendation for resampling and analysis of the stored CVXH, prior to commencing transport to DuPont, provides an opportunity to revisit the flammability issue prior to re-homogenizing the CVXH for further analysis. Regarding the potential for residual VX in the organic layer being a concern in the event of a release or spill of VX, CDC believes that such an event would be highly likely to involve substantial commingling of the organic and highly reactive aqueous phases. The characteristics of spilled material would not likely

	almost an order of magnitude lower (349.5 mg/kg v. 39.0 mg/kg, Attachment 2, page 4, Phase I report) for the top layer versus the bottom layer, it would appear that the organic top layer contains a much higher concentration of VX. There could be significant public or eco-health risks associated with an accidental release of the organic phase.	be significantly different (from a hazard characterization perspective) than homogenized CVXH. Personnel protection for spill responders and clean up considerations for a highly corrosive liquid should effectively address potential collateral toxicity.
	4. As noted, the significant variability (ca. 3- 12 hours) in the NECDF batch processing time for similar VX loading rates (Carmagen Report) implies a very complicated reaction chemistry. Therefore, it would be expected that the composition of the final product would vary. This could be an issue. How does mixing (or not mixing) different batches that have endured different reaction times impact down stream processes?	4. While CDC acknowledges the potential variability in the NECDF process, it is not thought to be significant enough to upset the DuPont process, as long as the waste criteria established by DuPont are met and continue to be met.
	5. Referring to Attachment 4 page 8 in the Phase I report, some ton containers were known to contain gelled/solid materials. Since the effect of this material on process performance was not reported and may be unknown and since there was no container inspection and segregation plan proposed, it seems that the reliability of the process can not be assured. This was not addressed in the subsequent testing or reporting.	5. There have been no ton containers with gelled material found in the process CVXH produced at NECDF to date. The agitation is expected to be sufficient to address this issue, but it is currently unknown.

3. Based upon the materials provided to CDC for review, are CDC's findings and recommendations adequately supported?

Peer Reviewer	**Reviewer Response**	**CDC Response**
Number 1	They appear to be adequately supported, with the exception of the second bullet on page 33 (repeated from a bullet on page 15) regarding potential changes in the CVXH during storage. If there is no data on changes in the waste during storage, this appears speculative. If so, is the risk involved in mixing and sampling of stored CVXH warranted?	On pages 2, 14 and 37, CDC Changed the recommendation from *Considering the potentially long storage time for the CVXH, NECDF needs to develop contingency plans to adequately sample the storage containers if the need arises. It is not currently known what impact, if any, such storage will have on the material's characteristics and its conformance to the clearance criteria.* to: *Considering the potential need to recharacterize the CVXH, NECDF needs to develop backup plans to adequately sample the storage. It is not currently known what impact, if any, long term storage will have on the material's characteristics and its conformance to the clearance criteria.*
Number 2	I consider all of the CDC's findings and recommendations to be completely supported by the data provided to me. In addition, I see conservatism and safety incorporated into both the recommendations for procedure and the management considerations. I was especially gratified to see the "combined" CDC and EPA recommendations on P. 33. This was interagency cooperation at its best.	Noted
Number 3	A few of CDC's conclusions seem to be based on the idiom "that things will work". 1. For example page 15 ; "need to develop contingency	1. CDC agrees that long term stability of stored

	plans". Of particular concern is the transportation and long term storage of corrosive degraded agent. There is no mention of specific safety and security precautions in route, long term stability of the degraded agent in corrosive solution in a container located in a secure facility? There seems to be need for a pilot study to test different aspects of transport and storage of the hydrolysate. Similarly, there appears to be need to conduct pilot studies of all aspects of the operation as part of scaling up of the system to full production levels. 2. Page 16 bottom "Without process upsets or measurable drop in performance" What about safety and surety of the process? What are the preliminary contingency plans?	CVXH is a question and accordingly recommended that provisions be made for resampling and analysis prior to transport to the DuPont treatment facility. Such analysis should include the clearance criteria and DuPont's waste acceptance criteria. Conformance with these criteria should ensure that risk management provisions for transport remain suitable, and that subsequent treatment at DuPont's facility is effective. Regarding the commenter's recommendations for scaling up pilot studies, the ramping-up process used by NECDF essentially serves in that capacity for operations; and as long as the CVXH meets all clearance and acceptance criteria additional transportation studies should not be needed. 2. At the time of this review, preliminary process feasibility studies were conducted to demonstrate the effectiveness of DuPont's waste treatment system. Details of specific process safeguards and contingency provisions would not be anticipated until there is a firm commitment to proceed with the project.
Number 4	See response to question 2 above. The report under review relies heavily on supporting documentation (e.g. Phase I report, Carmagen report). Taken *en masse*, the CDC recommendations appear adequately supported. However, from a reader's perspective, it would have been more facile to have more	Noted

	detail in sections 2 and 3 of the CDC report. It should be noted in the report that the DuPont pretreatment validation studies were performed at the bench scale. Notwithstanding the significant experience at DuPont, scaling up this process will be accompanied by many of the issues raised in earlier reports. These caveats should be mentioned. – Otherwise, YES	

4. Based upon the materials provided to EPA for review, are EPA's findings and recommendations adequately supported?

Peer Reviewer	**Reviewer Response**	**CDC Response**
Number 1	They appear to be adequately supported, with an exception on page 22-23. It states that "These chronic tests conducted to date do not take into consideration any chemical constituents which may remain in the PACT®. The ability to conduct such tests will not present itself until actual alternate processing of the CVXH and ACH begins." Why would there be concern about chemicals remaining in the PACT®? If they were adsorbed on the carbon, then they would not be in the effluent going to the river, but rather would be treated in the PACT® biotreatment system, or filtered out and land filled. If this view of the situation is correct, then would additional in-stream studies be warranted? In section 4.2.3 on PACT® Biotreatment contained in "Review of the U.S. Army Proposal for Off-Site Treatment and Disposal of Caustic VX Hydrolysate from the Newport Chemical Agent Disposal Facility,	The implementation of a baseline in-situ ecological assessment in the vicinity of the DuPont facility prior to discharge of treated hydrosolate is recommended by the USEPA. Due to the public scrutiny of this project and the unique nature of this wastestream, an ongoing program designed to monitor in-stream health and biological community structure using fish, macroinvertebrates, plus sediment and water chemistry in the vicinity of the DuPont discharge is recommended. It would be of greater benefit to collect baseline data prior to any processing of CVXH. Once the new wastestream is discharged, a snap shot of the receiving water's biological condition prior to CVXH waste discharge is lost. If Dupont already has such data, as the reviewer asserts, then an in-situ biological study prior to processing the CVHX is not an issue.

	4/05, it notes that the PACT® system was tested with both CVXH and HD hydrolysate from Aberdeen to determine the effect of alternating the bioreactor feeds on the performance of the biologic system, and perhaps this addresses EPA's concerns above about alternate processing of CVXH and ACH. On page 26, the statement that treatment/disposal of CVXH would constitute "a major permit modification pursuant to 40 CFR 122.62 (a) (1)" is not consistent with that CFR citation. Conditions for considering whether a modification is considered "major" are addressed by 40 CFR 122.63, while 122.62 (a) (1) addresses alterations but does not address major/minor considerations.	The Aberdeen material will be completed prior to the Newport CVXH. This is not an issue. Rephrased to *"The incorporation of treatment and disposal of the caustic VX hydrolysate into DuPont's permit would constitute a material and substantive alteration which would require a modification of the existing NPDES permit pursuant to 40 CFR 122.62 (a) (1) since this would be an additional wastestream not addressed in their current permit*."
Number 2	Aside from the notations provided in response to Question 1, all EPA findings are adequately supported by the data. However, I find the recommendation for a 5-member team to study and establish "base line in-stream bethnic macroinvertebrate and fish community structure" unsupportable. DuPont already has such data from the ACH studies and can provide such data for review by EPA. As EPA itself noted, "The ability to conduct such tests will not present itself until the alternate processing of the CVXH and ACH begins." One test run of ACH treatment and disposal should be followed by a CVXH treatment and disposal and the DRE (Delaware River Estuary) ecological tests should be completed. If no statistical differences in test species are noted,	The Aberdeen material will be completed prior to the Newport CVXH. This is not an issue.

	further runs should be done in conjunction with further DRE tests until all of the hydrolysates are dissipated.	
Number 3	Based on the materials provided, the EPA findings and recommendations are provided in depth and with clarity. There is a minor concern with the statement (page 33); "EPA believes that all of their previous ecological concerns have been addressed by DuPont or the Army". The statement is then followed by a series of recommendations including "EPA recommends that bioassessment studies be conducted etc., ".The apparent conflict between these statements needs to be resolved.	While DuPont met all the ecological concerns from the previous report, the implementation of a baseline in-situ ecological assessment in the vicinity of the DuPont facility prior to discharge of treated hydrosolate is recommended by the USEPA. Due to the public scrutiny of this project and the unique nature of this wastestream, an ongoing program designed to monitor in-stream health and biological community structure using fish, macroinvertebrates, plus sediment and water chemistry in the vicinity of the DuPont discharge is recommended.
Number 4	I do not know what was provided to EPA, therefore I cannot answer this question. But based on the information in the Phase II report, the EPA analysis appears logical and adequately supported. An important comment in the EPA report (bottom of page 22) notes that alternating CVXH and ACH could result in a displacement (or desorption) of various accumulated constituents from the PAC. This should be studied before moving to a full-scale process with discharge to the Delaware River.	The Aberdeen material will be completed prior to the Newport CVXH. This is not an issue.

5. Does EPA provide adequate detail to understand and address specific deficiencies identified in the Phase I report?

Peer Reviewer	**Reviewer Response**	**CDC Response**
Number 1	EPA's material, starting on page 20, appears to contain adequate detail to understand the water effluent toxicity	No action required

	issue, and what was done to address it. Findings from the tests performed by DuPont to address past EPA concerns (including tests done with whole effluent and salts), are noted in the text. On page 24, the EPA material deals with the breakdown products in hydrolysate, on page 25, it deals with phosphorus and permitting issues, and the text appears to contain adequate detail on their resolution.	
Number 2	Yes, all of the specific deficiencies in the Phase I report were addressed in adequate detail. We are all gratified that DuPont has utilized these oxidation-precipitation reactions utilizing sodium persulfate and hydrogen peroxide to oxidize the methyl ethyl phosphonate to methyl phosphonate, and to remove most organics and >99.9% of thiolamine. The methyl phosphonate is then reacted with $FeCl_3$ which can be filtered off and removed, leaving less than 1% of any substance of concern. While this is going to be very expensive, I'm sure all parties agree it must be done.	Noted
Number 3	The EPA letter report is concise but detailed enough to provide a clear picture of the inadequacies of the phase one report.	Noted
Number 4	Yes	Noted

6. Does the report adequately address the technical aspects of the Army's comments? If not, how should they have been addressed?

Peer Reviewer	**Reviewer Response**	**CDC Response**

Number 1	There were few Army technical comments, and the technical issues appear to have been addressed. There were multiple notes that typographical errors were found in the "*Assessment of the Treatability of Caustic VX Hydrolysate at the DuPont Secure Environmental Treatment Facility"* dated January 31, 2006. The response was that the report was final and no changes would be made. Perhaps an errata sheet could be provided with the report in the future, or added as an addendum. In the last paragraph on page 14 (CDC Attachment 1), it states that "…the continuing optimization of the NECDF process parameters create sufficient uncertainties that necessitate the additional QA/QC procedures recommended…" Similar statements are made elsewhere by others. Perhaps the issue is not one of more QA/QC (Quality Assurance/Quality Control) procedures being needed, but rather refinement of the sampling and analytical procedure to produce more consistent and accurate results.	The report acknowledges that the current system has been demonstrated to be capable of providing suitable data for CVXH clearance. The intent of CDC's discussion was to support its recommendation of a quality assurance approach often used in air monitoring programs at chemical agent demilitarization facilities. That approach is one of establishing a "running baseline" for precision and accuracy data that confirms that analytic data remains in statistical control throughout the life of the project. CDC believes that it is prudent, and because of the ongoing need for accurate characterization of CVXH, vital to maintain a continuing confirmation of the effectiveness of the sampling and analytic system. The report has been rephrased as shown below to more clearly reflect the CDC's intent that there be a long term commitment for ensuring statistically supported CVXH clearance analysis. The new recommendation is now: *Considering the potential need to recharacterize the CVXH, NECDF needs to develop backup plans to adequately sample the storage containers. It is not currently known what impact, if any, long term storage will have on the material's characteristics and its conformance to the clearance criteria.*
Number 2	All of the technical aspects of the Army's comments are addressed. The Phase II report addresses all of the technical aspects of the Army's comments on the Phase I report. In addition, the Army's Report "Effect of the DuPont Persulfate Treatment Process on Trace Quantities of VX and EA 2192 in Hydrolysate" further	Noted

	exemplifies the robustness of the DuPont oxidation process in eliminating any VX or S-(2-diisapropylaminoethyl) methyl phosponothioic acid in the unlikely event that trace amounts of either or both of these compounds were present in hydrolysate when it arrives at the DuPont Secure Environmental Treatment facility for ultimate disposal. I was gratified to see CDC bring up this point to the Army as I had suggested in one of my previous Peer Reviews. The report is quite clear and test design quite adequate to demonstrate that VX and EA2192 were less than 20 ppb ("non-detect" for the Army) (Test 2 results).	
Number 3	The document titled" Chemical Materials Agency Technical Review" contains CDC response to the most recent Army queries. For the most part, the technical aspects of the Army queries were adequately addressed. 1. However, there is need to provide in the text of the manuscript information about the MDL and LOQ in terms understandable to the lay public.	1. The MDL and LOQ terms are technical and not easily explained. CDC appreciates the reviewer's observation and provided the following changes: The following definition was added: *The LOQ is defined as the lowest level or concentration for which numerical results may be obtained with a specified degree of confidence.* A reference to the EPA citations was added*: The interested reader is encouraged to visit EPA's site, http://www.epa.gov/ost/methods/det/, on the internet to learn more about current developments regarding the MDL, LOQ and*

	2. In Sum, the revised plan in many respects will break new ground. With appropriate care it will be successful.	*other analytical concepts.* 2. Noted
Number 4	The Army raised many very good points in their review of Carmagen Report *"Assessment of the Treatability of Caustic VX Hydrolysate at the DuPont Secure Environmental Treatment Facility"* dated January 31, 2006. Although the CDC was attentive in their response to the Army comments, that report was considered in final form and was not changed. Consideration should be given to incorporating some of the clarifying statements to the Army comments in the Phase II report. For instance, comments #17 & 20 (in the CMA review of the Carmagen report) provide significant information regarding the etiology of the 25% failure rate and would be worth incorporating in the report. With regard to Army comments on the Phase II report, the CDC was attentive and responsive to the Army comments.	CDC will have Carmagen address the comments and make appropriate changes.